

REMARKS

Claims 1-22 are pending for the Examiner's review and consideration. Independent Claims 1, 8, 11, 17 and 18 have been amended to require that the position of the mobile body is changed corresponding to a distance that the mobile body travels due to the revolution of the motor. Support for these changes can be found at page 7, line 13 to page 8, line 23 of the specification. In view of the foregoing amendments and the following remarks, reconsideration and allowance are respectfully requested for Claims 1-22.

Claims 1-2, 4-13 and 15-22 stand rejected as allegedly unpatentable over U.S. Patent No. 6,396,229 to Sakamoto et al. ("Sakamoto") in view of U.S. Patent No. 4,922,175 to Sugiura et al. ("Sugiura") and U.S. Patent No. 6,283,252 to Lee. The Office Action alleges that it would have been obvious to estimate the position of the mobile body of either Sugiura or Lee using Sakamoto's method of controlling a synchronous motor. This rejection is traversed for the following reasons.

Applicants' invention relates to a controller for a mobile body (independent Claims 1, 11 and 17) and a method of controlling a mobile body (independent Claims 8 and 18) that is driven by a synchronous motor. According to the invention, a rotor position estimator uses electrical quantities (e.g., voltage, current, etc.) from the electric power supplied to the synchronous motor in order to estimate a magnetic pole position of a rotor of the motor. In turn, a mobile body position estimator estimates the position of the mobile body based on the

magnetic pole position estimated by the rotor position estimator. According to Applicants' invention, the mobile body is driven by the synchronous motor via a drive unit. Rotation of the synchronous motor is converted to a vertical direction motion (for example, see Figs. 1 and 2), a horizontal direction motion (see Fig. 3) or a diagonal direction motion (see Fig. 4) via the drive unit. The claimed mobile body position estimator thus is adapted to estimate the position of a mobile body in multiple directions.

As required by independent Claims 1, 8, 11, 17 and 18, the position of the mobile body is changed corresponding to a distance that the mobile body travels vis-à-vis the revolution of the motor. Thus, the mobile body position estimator estimates the mobile body position based on the magnetic pole position, which is estimated by the rotor position estimator (i.e., the mobile body position is determined indirectly). By using the invention, it is possible to control the position of a mobile body without using a mobile body position detector.

None of the cited references, whether taken alone or in combination, disclose or suggest such a combination of features.

Sakamoto discloses estimating the pole position of a rotor of a synchronous motor based on values related to the electric power supplied to the motor. However, as acknowledged at page 3 of the Office Action, Sakamoto does not disclose controlling a mobile body using a mobile body position estimator. Further, Sakamoto does not disclose or suggest estimating the position of a mobile body corresponding to a moving distance (displacement) of the mobile

body. The Office Action alleges that it would have been obvious to estimate the position of the mobile body of either Sugiura or Lee using Sakamoto's method of controlling a synchronous motor. Applicants disagree.

By this Amendment, Applicants have clarified each of independent Claims 1, 8, 11, 17 and 18 to require that the position of the mobile body is changed corresponding to a distance that the mobile body travels. Applicants have shown that a relationship between a rotor position of a synchronous motor and the position of a mobile body can be determined using the equations disclosed at page 7, line 13-page 8, line 23 of the specification. Accordingly, the position of a mobile body can be estimated using the estimated pole position of a rotor wherein the magnetic pole position of the rotor corresponds to the distance a mobile body travels. Sakamoto fails to disclose or suggest such a feature. Further, the secondary references fail to remedy the deficiencies of Sakamoto.

Sugiura discloses a device and method for detecting the position of a moving body on the basis of the output of a position detector (see abstract). A correct rotating angle is determined by processing an output signal of the position detector. Sugiura does not disclose or suggest obtaining the position of the mobile body corresponding to the moving distance (displacement) of the mobile body.

Regarding the rejection of Claims 19-22 based on the additional Lee reference, Applicants respectfully submit that Lee also fails to remedy the deficiencies of Sakamoto. Lee describes a leveling control device for an elevator,

wherein the position of the elevator is detected. However, as shown in Figs. 1 and 6, the position of the elevator of Lee is detected by a position detection unit and not by the use of a magnetic pole position. In other words, Lee does not disclose or suggest either a "rotor position estimator" or a "mobile body position estimator" much less that the position of the mobile body is changed corresponding to a distance that the mobile body travels.

In summary, as acknowledged by the Examiner, Sakamoto does not disclose or suggest a mobile body position estimator. Further, none of the cited references disclose or suggest the additional feature of changing the position of the mobile body based on a distance that the mobile body travels. Accordingly, Applicants submit independent Claims 1, 8, 11, 17 and 18 are patentable over the combination of cited references. The remaining dependent claims are deemed patentable for at least the same reasons that the independent claims are patentable.

It is submitted that the difference between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to person having ordinary skill in the art.

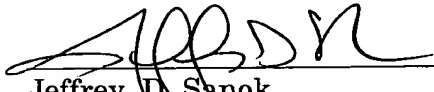
In view of the foregoing, the application is respectfully submitted to be in condition for allowance, and prompt favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #056207.50449US).

Respectfully submitted,

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Jeffrey D. Sanok
Registration No. 32,169

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844

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